

ENVIRONMENTAL PRODUCT DECLARATION









Declared product:

This Environmental Product Declaration (EPD) covers cement products manufactured by CEMEX Puerto Rico in the Ponce Plant.

Declared unit: 1 tonne of cement

Declaration Owner:

Cemex Puerto Rico

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Program Operator:

Labeling Sustainability

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ISO 21930:2017 Sustainability in Building Construction – Environmental Declaration of Building Products serves as the core PCR.

NSF PCR for PCR for Portland, Blended, Masonry, Mortar, and Plastic (Stucco) Cements v3.2 serves as the subcategory PCR

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Independent verification of the declaration and data, according to ISO 21930:2017 and ISO 14025:2006

✓ External □ Internal

Third-party verifier:

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Certified 3rd Party Verifier under Labeling Sustainability

(www.labelingsustainability.com)

EPD Software Tool: GCCA Industry EPD Tool for Cement and Concrete (V4.2), North

American version.

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1. COMPANY DESCRIPTION

CEMEX S.A.B. de C.V. (CEMEX) is a global building materials company dedicated to building a better future through sustainable products and solutions. CEMEX is committed to achieving carbon neutrality through constant innovation and industry leadership in research and development. CEMEX is at the front of the circular economy within the construction value chain and promotes innovative processes with the use of advanced technologies to increase the use of waste as raw materials and alternative fuels in its operations. CEMEX provides cement, ready-mix concrete, aggregates, and urban solutions in fast-growing markets around the world, powered by a multinational workforce focused on delivering superior customer experience, using digital technologies.

2. STUDY GOAL

The intended application of this life cycle assessment (LCA) is to comply with the procedures for creating a Type III environmental product declaration (EPD) and publish the EPD for public review. This level of study is in accordance with:

- EPD Product Category Rule (PCR) for Portland, Blended, Masonry, Mortar, and Plastic (Stucco) Cements (version 3.2, dated September 2021)¹ which is a sub-PCR of,
- International Standards Organization (ISO) 21930:2017 Sustainability in buildings and civil works
 Core rules for EPDs of construction products and services,
- ISO 14025:2006 Environmental labels and declarations, Type III environmental declarations Principles and procedures,
- ISO 14044:2006 Environmental management, Life cycle assessment- Requirements and guidelines, and,
- ISO 14040:2006 Environmental management, Life cycle assessment-Principles and framework.

The performance of this study and its subsequent publishing is in alignment with the business-to-business (B2B) communication requirements for the environmental assessment of building products. The study does not intend to support comparative assertions and is intended to be disclosed to the public. This EPD aims to offer customers information to help them make informed product decisions, improve the environmental performance of Cemex Puerto Rico by continuously measuring, controlling and reducing the environmental impacts of their products, help project facilitators working on green building rating systems, such as LEED projects, achieve their desired strategies. The intended audience for this EPD is Cemex' employees, project specifiers, architects, and engineers. The EPD report is also available for policy makers, government officials interested in

¹EPDs for cements that follow other PCRs may not be comparable.





sustainability, academic professors, and LCA professionals.

Only EPDs prepared from cradle-to-grave life-cycle results and based on the same function, reference service life, and quantified by the same functional unit, can be used to assist purchasers and users in making informed comparisons between products. Since EPDs developed under these PCR only cover the cradle-to-gate impacts of Portland, blended hydraulic, masonry, mortar, or plastic (stucco) cements, using a declared unit, the results cannot be used to compare products used in different mixtures and construction products. As per the PCR, EPDs based on a declared unit shall not be used for comparisons. If cement EPDs are used to compare two different cements, the functional units must be the same. This EPD does not include product comparisons from other facilities.

3. PRODUCT INFORMATION

• Product Identification

This EPD is prepared for products classified as UN CPC Group 3744-Cement or CSI MasterFormat Division 03 30 00 Cast-in-Place Concrete.

Cement Design Summary

The following table provides a list of the cement products considered in this EPD along with key performance parameters.

	Table 1. Declared products considered in this Environmental Product Declaration										
N°	ID	Description	Strength at 7 days (psi)	Strength at 28 days (psi)	Standard						
1	Cemento Ponce: Uso General	Type GU General Use Cement	<2900	<4060	ASTM C1157						
2	Cemento tipo 1T	Type 1T ternary blended cement	4200-4500	5700-6100	ASTM C595						
3	Cemento de Albañilería	Type N Masonry cement	1100-1600	1900-2400	ASTM C91						

The following table provides the mass breakdown (kg per declared unit) of the material composition of each cement design considered. Please note that the breakdown has been randomly altered and is therefore only an approximation; this manipulation is to ensure confidentiality.

Table 2. Cement Composition							
Product Components	Raw Material, weight (%)						
Clinker	Proprietary						
Mineral Additions (pozzolan, limestone, gypsum)	20 – 50						
Others (e.g. slag)	0 – 10						





4. Life Cycle Assessment (LCA)

The Life Cycle Assessment (LCA) study adheres to the requirements outlined in ISO 21930:2017, ensuring credibility and standardization.

4.1 Declared Unit

The declared unit is 1 tonne of cement.

4.2 Time representativeness

All data was collected by Cemex at its own plants between January and December 2024 (12 months) and the data collected is representative of the production technology used in 2024.

4.3 LCA Software and Data Bases Used

The Life Cycle Assessment was developed using the GCCA Industry EPD Tool for Cement and Concrete (V4.2), North American version, which uses Ecoinvent v3.5 and GCCA datasets for the LCA database.

Environmental assessment information

4.4 System Boundaries

The following figure depicts the cradle-to-gate system boundary considered in this study:

	(MA – Module assessed, MNA – Module not assessed, INA – Indicator Not Assessed)															
Product stage Construction process				Use stage End of life						Benefits and loads beyond the system boundary						
Raw material supply	Transport	Manufaturing	Transport to construction site	Construction installation process	Use	Maintenance	Repair	Refurbishment	Operational energy use	Operational water use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse-recovery recycling potential
A1	A2	А3	Α4	A5	В1	B2	А3	B4	B5	В6	В7	C1	C2	C3	C4	D
МА	МА	MA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA

Figure 1. General life cycle phases for consideration in a construction works system

- **1.** Al: Raw material supply (upstream processes) Extraction, handling, and processing of the materials used in manufacturing the declared products in this LCA.
- 2. A2: Transportation Transportation of A1 materials from the supplier to the "gate" of the manufacturing facility (i.e., A3). The Life Cycle Assessment model for the North American version of the GCCA EPD Tool considers common practices in the cement and concrete industry.
- **3.** A3: Manufacturing (core processes) The energy and other utility inputs used to store, move, and manufacture the declared products and to operate the facility.

The subcategory PCR recognizes fly ash, silica fume, granulated blast furnace slag, cement kiln dust, flue gas desulfurization (FGD) gypsum, and post-consumer gypsum as recovered materials and thus the environmental impacts allocated to these materials are limited to the treatment and





transportation required to use as a cement material input.

Not all LCA datasets for upstream materials include these impact categories and thus results may be incomplete. Use caution when interpreting data in these categories.

In addition, according to the relevant PCR, the following requirements are excluded from this study:

- Production, manufacture and construction of A3 concrete/building/capital goods and infrastructure.
- Production and manufacture of production equipment, delivery vehicles, earthmoving equipment, and laboratory equipment.
- Personnel-related activities (travel, furniture, office supplies).

4.5 Process Information

4.5.1 Modules A1 - A2: Extraction and transport of raw materials

The Ponce cement plant is a grinding plant and as such, does not possess a kiln to manufacture clinker.

The clinker is transported through land and maritime modes from the suppliers to the cement plant in Puerto Rico. A unique average Ecoinvent transoceanic freight ship transport process is considered for transport by boat. The effect of considering a unique boat transport process, regardless of the possible specificities of boat transportation per region, is considered negligible. Infrastructure, maintenance and end-of life of waterways and boats are taken into consideration.²

Truck transportation calculations are based on the weight of transported products per unit of clinker and on the distances travelled per transported product. The volume of the materials was not considered because the majority of the transported materials are weight-limited and not volume-limited.

The analysis accounts for all truck journeys including empty backhauls and is used to allocate an impact per truck per km to a tonne transported over 1 km (one tkm). This approach allocates empty backhauls, on average, to a tkm of transported merchandise.

The distances considered for materials are detailed in the following table:

Table 3. Transport Distances								
Product Components	Maritime distance (km)	Land distance (km)						
Clinker	9,100	11						
Pozzolan	-	21						
Limestone	-	29						
Gypsum	6,400	11						
Others (e.g. slag)	20,500	11						

² Information taken from the GCCA Industry EPD Tool for Cement and Concrete: LCA Model, North American version, 18 December 2023.





4.5.2 Module A3: Production

The clinker is ground through steel balls of different sizes as it passes through the two chambers of the mill, adding gypsum to lengthen the setting time of the cement. The cement is sent to the storage silos; from which it is extracted by pneumatic or mechanical systems, being transported to where it will be packaged in paper sacks or supplied directly in bulk.

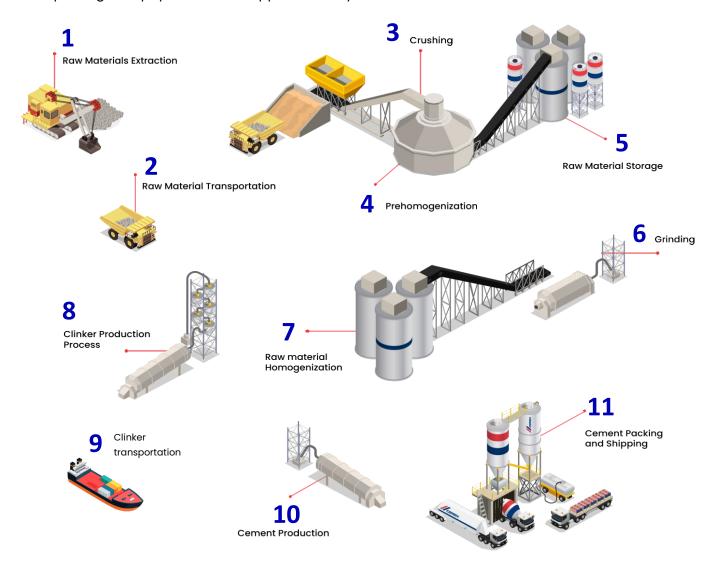


Figure 2. Cement Production (clinker manufacturing is included in the study but not within the scope of Cemex's operations)

5. CUT-OFF CRITERIA

ISO 14044:2006 and the focus PCR requires the LCA model to contain a minimum of 95% of the total inflows (mass and energy) to the upstream and core modules be included in this study. The cut-off criteria were applied to all other processes unless otherwise noted above as follows. A 1% cut-off is considered for all renewable and non-renewable primary energy consumption and the total mass of inputs within a unit process where the total of the neglected inputs does not exceed 5%.





6. DATA SOURCES

- Raw material transport: Actual distance data is used for each key bulk material. For those materials with more than one supplier, the distance is weighted to obtain a single datum.
- Material loss: The Operations, Operational Excellence and Internal Control teams strive to maintain meticulous control of material inventory, performing several monitoring and management processes to limit material loss.
 - According to these process controls, there are different permitted inventory deviations that adhere to the following maximums, which are used as material loss factors: 1% for clinker and 2% for pozzolan, limestone, gypsum and slag.
- Electricity: Cemex Puerto Rico's Ponce Plant consumes electricity the national grid. The national electricity mix used is published by the authorities (U.S. Energy Information Administration³)
- Fuel required for machinery: Fuel related to on-site machinery was determined through direct measurement based on records kept by the operations.
- Waste generation: Waste generation values are directly reported from CEMEX operations.
- Recycled/reused material/components: CEMEX is committed to sustainability and circularity practices and uses post-industrial material waste (considered pre consumer recycled content) as inputs to its products, to save virgin raw materials as well as reducing impacts within and outside its boundaries. Several cement blends use ground granulated blast-furnace slag, the quantities are directly reported from CEMEX operations.
- Imported clinker: The clinker used in this grinding plant is imported from two different sources— Egypt (80%) and Turkey (20%). The associated transportation distances and impacts of maritime and terrestrial transport are included in the calculations. Due to the absence of supplier-specific environmental data (LCA or EPD) for the imported clinker, default datasets were used to model its environmental impacts. These datasets, based on a 2020 survey of PCA members, are the same as those used to generate the U.S. industry average EPD of cement via the GCCA EPD Tool. While it introduces a degree of uncertainty, several sensitivity checks were performed relative to industry averages (PCA industry average and GCCA's GNR data⁴) and internal Cemex data.

The results of the comparisons show that differences in principal outputs are within expected ranges, so there is a high degree of assurance in the results and their representativeness for the declared products (less than 10% difference).

- Imported clinker GWP: To ensure region specific data is used where available, global warming potential was calculated using direct clinker emission data from the GCCA's GNR, then a conversion factor was applied to estimate the GWP as follows:
 - The GNR contains the weighted average gross emission per ton of clinker according to the

³ https://www.eia.gov/state/print.php?sid=RQ

⁴ The GNR (GCCA in Numbers) is a database and reporting tool managed by the GCCA to track and report the industry's sustainability commitments. This database is used to determine the direct emissions from the clinker according to the place of origin.





- different regions and countries, the table 4 shows the latest available data for Egypt and Turkey (2023).
- 2. The emissions were converted to GWP (Cradle-to-Gate) by applying a correction factor of 12.42%, which includes Scope 2 and 3 emissions. This factor was calculated as a weighted average of the ratio between the specific direct emissions of clinker and the corresponding total GWP from all Cemex operations that produced clinker. This information was audited by an independent third party in January 2025 and used in the various sustainability reports published by the company. Table 4 shows the GWP used in this EPD.

Table 4. Global Warming Potential Calculation

Clinker source	Allocation	GNR - Direct emissions (kg CO₂/ton clinker)	Global Warming Potential (kg CO ₂ /ton clinker)
Turkey	20%	851.78	957.57
Egypt	80%	857.05	963.75
Global War	ming Potential u	962.12	

• Waste transport requirements: Transport distances use actual values between the plant location and the waste treatment location.

7. DATA QUALITY ASSESSMENT

Data quality/variability requirements, as specified in the PCR, are applied. This section describes the data quality achieved relative to the ISO 14044:2006 requirements. Data quality is judged based on its precision (measured, calculated, or estimated), completeness (e.g., unreported emissions), consistency (degree of uniformity of the methodology applied within a study serving as a data source) and representativeness (geographical, temporal, and technological).

- Precision: Thorough measurement and calculation; the manufacturer collected and provided primary data on their annual production.
- Completeness: All relevant specific processes, including inputs (raw materials, energy, and
 ancillary materials) and outputs (emissions and production volume) were considered and
 modeled to represent the specified and declared products. Most relevant background materials
 and processes were taken from Ecoinvent v3.5 LCI datasets and GCCA data where relatively
 recent region-specific electricity inputs were utilized. The most relevant EPDs requiring key A1 input
 were also utilized where readily available.
- Consistency: To ensure consistency, the same modeling structure across the respective product systems was utilized for all inputs, which consisted of raw material inputs and ancillary material, energy flows, water resource inputs, product, and co-products outputs, returned and recovered Cement materials, emissions to air, water and soil, and waste recycling and treatment. The same background LCI datasets from the GCCA EPD Tool (which includes the Ecoinvent v3.5 database and GCCA data) were used across all product systems. Cross checks concerning the plausibility of mass and energy flows were continuously conducted. The LCA team conducted mass and energy balances at the plant and selected process level to maintain a high level of consistency.





- Reproducibility: Internal reproducibility is possible since the data and the models are stored and available in a consolidated database with all inputs and all background reports (outputs) within Cemex' archives and within the GCCA's Industry EPD Tool. The Life Cycle Assessment and calculations for all foreground and background processes are contained within the Industry EPD Tool and replicable at any moment. A considerable level of transparency is provided throughout the detailed LCA report as the specifications and material quantity make-up for the declared products are presented and key primary and secondary LCI data sources are summarized. The provision of more detailed publicly accessible data to allow full external reproducibility was not possible due to reasons of confidentiality.
- Life Cycle Assessment tool: GCCA's Industry EPD Tool for Cement and Concrete is a web-based
 calculation tool for EPDs of clinker, cement, aggregates, concrete and precast elements, available
 in both International and North American versions. The latter complies with the latest North
 American cement and concrete PCRs registered at NSF International, namely PCR for Portland,
 Blended, Masonry, Mortar, and Plastic (Stucco) Cements (version 3.2, dated September 2021).

The tool produces a background report with the complete set of input data and results of the specific product. This document is in the form of an Excel file that contains all the information required to produce an EPD and for a verifier to validate it.

- Representativeness: The representativeness of the data is summarized as follows.
 - Time related coverage of the manufacturing processes' primary collected data from 2024-01-01 to 2024-12-31.
 - Upstream (background) LCI data was either the PCR specified default (if applicable) or more appropriate LCI datasets as found in the country-adjusted Ecoinvent v3.5 database, latest GNR database or GCCA North American database.
 - Geographical coverage for inputs required by the A3 facility is representative of its region
 of focus; other upstream and background processes are based on US, North American,
 regional or global average data and adjusted to regional electricity mixes when relevant.
 Global Warming Potential was regionally adjusted using the latest GNR data for Egypt and
 Turkey, however, other impact categories rely on US averages. The default clinker dataset
 for the U.S. is based on the survey to PCA members conducted in 2020.
 - Technological coverage represents the technology in use at the Ponce plant, with upstream processes typical or average for North American industry LCI datasets.

8. ENVIRONMENTAL INDICATORS AND INVENTORY METRICS

Per the PCR, this EPD supports the life cycle impact assessment indicators and inventory metrics as listed in the tables below. As specified in the PCR, the most recent US EPA Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI), impact categories were utilized as they provide a North American context for the mandatory category indicators to be





included in the EPD. Additionally, the PCR requires a set of inventory metrics to be reported with the LCIA indicators.

The following LCA impact categories and inventory items are still under development and can have high levels of uncertainty that preclude international acceptance pending further development. Use caution when interpreting data in these categories:

- renewable primary energy resources as energy (fuel), (RPRE).
- renewable primary resources as material, (RPRM).
- nonrenewable primary resources as energy (fuel)(NRPRE).
- nonrenewable primary resources as material (NRPRM).
- secondary materials (SM).
- renewable secondary fuels (RSF).
- nonrenewable secondary fuels (NRSF).
- recovered energy (RE).
- abiotic depletion potential for non-fossil mineral resources (ADPelements).
- land use related impacts, for example on biodiversity and/or soil fertility.
- toxicological aspects.
- emissions from land use change (GWP 100 [land-use change]).
- hazardous waste disposed;
- nonhazardous waste disposed;
- high-level radioactive waste;
- intermediate and low-level radioactive waste;
- components for reuse;
- materials for recycling;
- materials for energy recovery; and
- recovered energy exported from the product system.

9. LIMITATIONS

This EPD is a declaration of potential environmental impact and does not support or provide definitive comparisons of the environmental performance of specific products. Only EPDs prepared from cradle-to-grave life cycle results and based on the same function and reference service life and quantified by the same functional unit can be used to assist purchasers and users in making informed comparisons between products. LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Furthermore, Life Cycle Assessments offers a wide array of environmental impact indicators, and this EPD reports a collection of those, as specified by the PCR. In addition to the impact results, this EPD provides several metrics related to resource consumption and waste generation. While this data may be informational in other ways, they do not provide a measure of impact on the environment.

 While every effort has been made to ensure the accuracy and representativeness of the life cycle inventory data, it is important to note that U.S. default datasets were used to model the environmental impacts of imported clinker due to the absence of supplier-specific data. This





approach may affect the precision of certain impact categories, particularly those sensitive to regional production practices. However, this limitation does not invalidate the EPD. The results remain robust and reliable for their intended use, especially given that sensitivity checks against PCA industry averages and internal Cemex data confirmed that variations fall within expected ranges. Users are advised to consider this context when interpreting the results.





10. ENVIRONMENTAL IMPACT SUMMARY

Table 5. Core environmental impact indicators

	Environmental Impacts: 1 tonne of cement.										
Indicator	GWP-tot	ODP ΔP FP		РОСР	ADPE	ADPF					
Unit	kg CO₂ eq.	kg CO₂ eq.	kg CFC 11 eq.	kg SO₂ eq.	kg N eq	kg O ₃ eq. kg Sb		MJ, net calorific value			
Cemento tipo 1T	906	6.60E-2	4.19E-5	3.12	1.18	41.5	1.64E-4	5.27E3			
Cemento Ponce: Uso General	710	5.71E-2	3.67E-5	2.56	0.95	33.4	1.41E-4	4.32E3			
Cemento de Albañilería	605	4.15E-2	3.20E-5	2.10	0.77	28.5	1.23E-4	3.70E3			
Acronyms	ozone layer)	GWP-tot (Global warming potential) • GWP-bio (Global warming potential, biogenic) • ODP (Depletion potential of the stratospheric ozone layer) • AP (Acidification potential of soil and water sources) • EP (Eutrophication potential) • POCP (Photochemical oxidant creation potential) • ADPE (Abiotic depletion potential for non-fossil mineral resources) • ADPF (Abiotic depletion potential for fossil resources)									

Table 6. Parameters describing resource use

	Resources Used: 1 tonne of Cement.											
Indicator	PERE	PERM	PERT	PENRE	PENRM	PENRT	SM	RSF	NRSF	NFW		
Unit	MJ	MJ	MJ	MJ	MJ.	MJ	kg	MJ	MJ	m³		
Cemento tipo 1T	123.9	0.00	123.9	5.23E3	0.00	5.27E3	138.8	47.6	458.9	1.59		
Cemento Ponce: Uso General	101.6	0.00	101.6	4.32E3	0.00	4.32E3	127.0	36.1	347.7	1.48		
Cemento de Albañilería	83.3	0.00	83.3	3.70E3	0.00	3.70E3	39.3	30.6	295.2	1.30		
Acronyms	PERE (Use of renewable primary energy excluding renewable primary energy resources used as raw materials) • PERM (Use of renewable primary energy resources used as raw materials) • PERT (Total use of renewable primary energy resources) • PENRE (Use of non-renewable primary energy excluding non-renewable primary energy											

Table 7. Other environmental information describing waste categories and output flows

	Other Environmental Information: 1 tonne of cement											
Indicator	Net GWP-tot *	Net GWP-bio *	HWD	NHWD	RWD	CRU	MFR	MER	EE			
Unit	kg CO₂ eq.	kg CO₂ eq.	kg	kg	kg	kg	kg	kg	MJ / energy carrier			
Cemento tipo 1T	874	6.60E-2	1.09E-2	4.49	ND	0.00	1.54	0.00	1.70			
Cemento Ponce: Uso General	686	5.71E-2	8.28E-3	3.41	ND	0.00	1.43	0.00	1.29			
Cemento de Albañilería	584	4.16E-2	7.03E-3	2.90	ND	0.00	1.37	0.00	1.10			

GWP values (gross values) include the greenhouse gas emissions from the coprocessing of secondary fuels at clinker production. The net GWP values exclude the emissions from the coprocessing of secondary fuels at clinker production.

Acronyms: GWP (Global Warming Potential) HWD (Hazardous waste disposed) NHWD (Non-hazardous waste disposed) RWD (Radioactive waste disposed) CRU (Components for re-use) MFR (Materials for recycling) MER (Materials for energy recovery) EE (Exported energy)

The indicator 'Radioactive waste disposed' is not calculated. The only contribution in the cement sector is the indirect contribution from the nuclear power share in the electricity mix, which is considered not to be significant given that the sector is not electricity intensive.





11. REFERENCES

- ISO 14025:2006 Environmental Labels and Declarations Type III Environmental Declarations - Principles and Procedures
- ISO 14040:2006 Environmental Management Life Cycle Assessment Principles and Framework
- ISO 14044:2006 Environmental Management Life Cycle Assessment Requirements and Guidelines
- ISO 21930, Sustainability in building construction Environmental declaration of building products.
- Labeling Sustainability Program Operator for Product Category Rules (PCRs) and Environmental Product Declarations (EPDs): General Program Instructions
- ASTM C595 Standard Specification for Blended Hydraulic Cement
- ASTM C1157 Standard Specification for General Use Cement
- ASTM C91 Standard Specification for Masonry Cement; for use in preparing Type N mortars according to ASTM C270.
- NSF International PCR for Portland, Blended, Masonry, Mortar, and Plastic (Stucco)
 Cements v3.2
- GCCA Industry EPD Tool for Cement and Concrete (v4.1), North American Version